

**WHAT IS CLAIMED IS:**

1. A thermal processing apparatus to heat a substrate by irradiating light to said substrate, comprising:

5           a light source consisting of a plurality of lamps arranged in a plane;  
a hold element to hold a substrate at a location below said light source; and  
a diffusion plate that is disposed between said light source and a substrate held  
by said hold element such that they are substantially parallel with one another, said  
diffusion plate diffusing light emitted from each of said plurality of lamps and directing it  
10          to said substrate;

              wherein in said diffusion plate, the light transmittance of a center corresponding  
part located in a vertical immediate downward direction of an arrangement of said  
plurality of lamps is lower than the light transmittance of an end corresponding part  
located outside said center corresponding part.

15           2. The thermal processing apparatus according to claim 1 wherein  
the light transmittance decreases gradually from said end corresponding part to  
said center corresponding part in said diffusion plate.

20           3. A thermal processing apparatus to heat a substrate by irradiating light to  
said substrate, comprising:

              a light source consisting of a plurality of lamps arranged in a plane;  
a hold element to hold a substrate at a location below said light source; and  
a diffusion plate that is disposed between said light source and a substrate held  
25          by said hold element such that they are substantially parallel with one another, said

diffusion plate diffusing light emitted from each of said plurality of lamps and directing it to said substrate;

wherein in said diffusion plate, the light transmittance of a lamp corresponding part located in a vertical immediate downward direction of each of said plurality of lamps 5 is lower than the light transmittance of an inter-lamp corresponding part located between said lamp corresponding parts adjacent to each other.

4. The thermal processing apparatus according to claim 3 wherein  
the light transmittance increases gradually from a central position of said lamp  
10 corresponding part to a central position of said inter-lamp corresponding part in said diffusion plate.

5. The thermal processing apparatus according to claim 3 wherein  
the light transmittance of an end corresponding part located outside space in a  
15 vertical immediate downward direction of an arrangement of said plurality of lamps in said diffusion plate is higher than the light transmittance of said lamp corresponding part.

6. A thermal processing apparatus to heat a substrate by irradiating light to  
said substrate, comprising:  
20 a light source consisting of a plurality of flash lamps arranged in a plane;  
a hold element to hold a substrate at a location below said light source; and  
a diffusion plate that is disposed between said light source and a substrate held  
by said hold element such that they are substantially parallel with one another, said diffusion plate diffusing light emitted from each of said plurality of flash lamps and  
25 directing it to said substrate.

7. The thermal processing apparatus according to claim 6 wherein  
in said diffusion plate, the light transmittance of a lamp corresponding part  
located in a vertical immediate downward direction of each of said flash lamps is lower  
5 than the light transmittance of an inter-lamp corresponding part located between said  
lamp corresponding parts adjacent to each other.

8. The thermal processing apparatus according to claim 7 wherein  
the light transmittance increases gradually from a central position of said lamp  
10 corresponding part to a central position of said inter-lamp corresponding part in said  
diffusion plate.

9. The thermal processing apparatus according to claim 6 wherein  
the light transmittance of an end corresponding part located outside space in a  
15 vertical immediate downward direction of an arrangement of said plurality of flash lamps  
in said diffusion plate is higher than the light transmittance of said lamp corresponding  
part.

10. The thermal processing apparatus according to claim 6 wherein  
20 said diffusion plate is a glass plate in which a geometrical pattern in a ground  
glass state is formed in a region located above parts other than an edge part of a substrate  
held by said hold element.

11. The thermal processing apparatus according to claim 10 wherein said  
25 geometrical pattern is a stripe pattern.

12. The thermal processing apparatus according to claim 10 wherein said geometrical pattern is a parallel crosses pattern.

5 13. The thermal processing apparatus according to claim 10 wherein said geometrical pattern is a woven bamboo pattern.

10 14. The thermal processing apparatus according to claim 6 wherein each of said flash lamps is a xenon flash lamp, and said hold element has an assist heating element to preheat a substrate to be held.